Effectiveness of introducing innovative solutions in machine-building as a factor of competitive immunity of the enterprise

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Effectiveness of introducing innovative solutions in machine-building as a factor of competitive immunity of the enterprise

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Abstract. The implementation of an innovation process at a machine-building enterprise provides a systematic approach to the formation of competitive immunity. The article deals with an assessment methodology which enables the necessary control over the innovation process implementation, minimizes costs for innovative activity, and helps to adjust the innovation process direction in the optimal way. The significance and attractiveness of this methodology is due to the fact that it can be applied for industrial enterprises of any economic branches regardless of the lifecycle phase of a product, enterprise and/or innovation process under study, because the list and number of specific indicators can be adjusted by the working group both before conducting the study and during the process of implementing the enterprise's innovative activity (at any stage of its implementation). The application of the competitive immunity formation strategy during the innovation processes implementation will help to create a model of industrial partnership development, which will ensure the competitive coexistence of machine-building enterprises.

Innovative activity, which helps to determine the development directions ensuring effective functioning, is one of the most important factors of the competitiveness of a machine-building enterprise under current complicated conditions. This provides a systematic approach to the formation of the enterprise's competitive immunity. This term was introduced into scientific discourse by a group of scientists: A. Tatarkin, S. Vazhenin, I. Vazhenina. They understand the competitive immunity as the economic entity's ability not only to compete successfully, but also to confront potential risks arising from external and internal shocks and to recover from destructive events as well, due to internal resources and assets [1]. Indicators, which are a correlation of the activity's results and the costs of its implementation, i.e. the efficiency, are usually used upon assessing the functioning of enterprises. At the same time, some scientific papers contain the opinion that it is necessary to place emphasis on both the efficiency and the effectiveness, i.e. the ability to obtain results facilitating the target goals achievement, when making an assessment. [2]

This approach is particularly topical with regard to the issue of determining the efficiency of innovation processes implementation in the machine-building industry. Indeed, when receiving any innovation (in the form of a new product, technology, management method, etc.), it is extremely important to receive it at minimal costs, and, in addition, the innovation itself must be in demand both at the enterprise, which initiates its introduction, and in the market, where the machine-building enterprise operates. [3, 4] Time, i.e. how quickly we achieve the target goal, is the most important factor

under today's conditions. If the innovative activity to be conducted is both necessarily in demand and cost-effective enough, but the whole process of receiving these innovations is more long-lasting compared to the average duration of processes at competing enterprises, then it is obvious that the functioning of the organizational and economic mechanisms for the implementation of innovation processes at this enterprise will not be efficient. [5, 6]

The market specifies conditions for the directions of innovative activity and predetermines:

- the necessity for new innovative solutions;
- alternatives when choosing a specific innovation process;
- the scale of the innovation spread;
- terms of the innovation use and its replacement with a new one. [7]

Now we would like to enlarge upon the assessment of practical application of methodological principles of organizational and economic mechanism of innovation processes implementation at the enterprise. The indicators, which reflect the application of organizational and economic mechanism methodological principles in business environment when introducing innovations of various difficulty levels, must meet the requirements specified for ensuring the reliability of assessing changes in conditions, which institutionalize the innovation process being introduced at the enterprise and stimulate the company's innovative activity development in general. Namely:

1. To express the nature of the organizational and economic mechanism of innovation process implementation and to make a quantitative and qualitative assessment of its functioning.
2. To be comprehensive, making it possible to obtain a multi-aspect specification of conditions which affect the innovations institutionalization at the enterprise.
3. To ensure reliability, completeness and timeliness of obtaining information for the possibility of flexible and adaptive innovative activity management in general.
4. To take into account the possibility of changes in the enterprise's innovative activity development conditions and tasks.

It is suggested that the assessment of the functioning of the organizational and economic mechanism for the implementation of innovation processes is performed according to three criteria:

- effectiveness;
- cost-efficiency;
- time.

At the same time, we suggest conducting this assessment in three stages:

1. To assess the effectiveness of the innovation process.
2. To assess the practical application of the principles of the organizational and economic mechanism for the implementation of innovation processes.
3. To assess the effects of the innovative activity based on indicators obtained during the first and the second stages.

In addition, it is necessary to note that the following information features were considered when choosing the indicators of the organizational and economic mechanism functioning assessment:

 Objectivity and controllability. The indicators, the values of which can be compared to the values of the previous periods, should be used. The cases of indicators redefinition over time should be minimized. The way of initial information collecting and processing must permit the possibility of obtained data accuracy check during the process of independent monitoring;

 Adequacy of current changes reflection. The indicators must serve as a reliable basis for innovations effectiveness assessment. The data must be accurate enough for the purposes of their use and be submitted regularly (i.e. at strictly determined intervals) and timely;

 Cost-efficiency. Opportunity to obtain necessary data without going beyond economically justified cost limits. The indicator must rely on already available information;

 Compliance with the target goal (relevance). Each separate indicator must be aimed at measuring the progress in a specific task solving;

 Accuracy and unambiguity. The choice of indicators should be performed on the grounds of the need for continuous data collection and based on ensuring their comparability over particular periods of

time. The indicator's nature must be clear both to the working group employees performing the calculation and to the department heads.

In our point of view, it is necessary to assess the effectiveness of the innovation process according to three aspects: organizational and managerial, social, and production.

1. Organizational and managerial effectiveness reflects the degree of the production system hierarchy optimization, the level of coordination and subordination relations. O is an integrated indicator which determines the organizational effectiveness of the innovation process:

$$O = \sqrt[3]{R_{dp} * R_{sm} * R_m}\ , \tag{1}$$

where R_{dp} is a ratio of profitable divisions;

R_{sm} is structuredness of a management apparatus;

R_m is controllability of a management apparatus.

2. Social effectiveness of the innovation process reflects the consumer and social significance of created new or improved material products for the society and individuals. S is an integrated indicator which determines the social effectiveness of the innovation process:

$$S = \sqrt[2]{C_{qual} * C_{ecol}}\ , \tag{2}$$

where C_{qual} is a quality ratio;

C_{ecol} is a ratio of environmental safety of production activity.

3. Production effectiveness reflects the rise of the level of production and engineering activity of an enterprise and the quality of work performed by its employees. P is an integrated indicator which determines the production effectiveness of the innovation process:

$$P = \sqrt[4]{(U_{aut} * U_{tp} * U_{pr.}) / U_{def}}\ , \tag{3}$$

where U_{aut} is a level of the engineering process mechanization and automation;

U_{tp} is a level of the engineering advancement;

U_{pr} is productivity;

U_{def} is waste losses to products output.

The suggested system of integrated indicators reflects the innovation introduction effectiveness, and its application will help to choose the direction for further organizational transformations related to this innovation and the development of the enterprise's innovative management strategy in general. After the formation of a multi-aspect system of indicators for the direct assessment of the innovation process effectiveness, we suggest using a graphical method. The indices of the integrated indicators O, S and P are plotted along the axes (the study frequency is the same). Then a center of the triangle is to be found. It reflects the integrated result of the innovation process under study and illustrates the indicators which have responded to a greater degree. The assessment of the innovation process effectiveness is reduced to tracking the dynamics of this active point movement and the analysis of its new position.

The application of the competitive immunity formation strategy during the innovation processes implementation will help to create a model of industrial partnership development, which will ensure the competitive coexistence of machine-building enterprises, by giving it the status of a modern institution of the state industrial development. [8, 9] The developed methodology for assessing the effectiveness of innovations introduction helps to monitor the development direction quickly and contributes to the optimal choice of the direction for further organizational transformations related both to this innovation and the development of the enterprise's management strategy in general. The method is applicable both during the innovation implementation at any stage as a basic control element and for the assessment of the innovation process final effectiveness.

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